CHAPTER VIII
CONCLUSIONS

We have investigated the turbulent wall shear stress of aqueous solutions of PEO, HTAC, and their mixtures at 30°C in Couette flow, at various PEO molecular weights and concentrations. In agreement with literature results, we find that higher molecular weights of PEO exhibit maximum drag reduction at lower optimum PEO concentrations. There is a critical molecular weight of polymer where drag reduction does not occur. The optimal concentration for maximum drag reduction appears to scale inversely with polymer hydrodynamic volume. In dilute HTAC solutions, at concentrations below the CMC, we find turbulent wall shear stress diminishes significantly with HTAC concentration even though a threadlike micellar network structure does not exist in the quiescent solution. In aqueous HTAC/PEO mixtures, when the PEO molecular weight is below the critical value for drag reduction (M_w = 0.91×10^5), binding of HTAC micelles induces drag reduction, presumably because of the accompanying increase in hydrodynamic volume of the complex. For solutions of high molecular weight PEO, M_w equal to 6.06×10^5 and 17.9×10^5 g/mol, at their optimum PEO concentrations for drag reduction, c^*_{PEO}, wall shear stresses increase with addition of HTAC, because the increase of hydrodynamic volume causes a shift of the optimum PEO concentration for drag reduction to lower values. Since this effect is seen at HTAC concentrations below the quiescent CAC, it appears that the CAC may be lowered in turbulent flow. Wall shear stress measurements on HTAC solutions reveals that the optimal concentration for maximum drag reduction decreases with increasing molar ratios of NaCl to HTAC. In PEO solutions on titration with HTAC, the wall stress increases up to the CMC and then decreases or levels off. This is due to a shift of the optimum concentration for drag reduction to a smaller value, the magnitude of the shift decreasing with increase of ionic strength. It appears that pure polymer solution at c^*_{PEO} exhibits the lowest wall shear stress and friction factor when compare to pure HTAC and PEO-HTAC complex solutions.